Dementia Australia™ Research Foundation

2020 Dementia Grants Program

Race Against Dementia – Dementia Australia Research Foundation Post-doctoral Fellowships*

Lead Investigator	Project Title	Institution
Dr Adekunle Bademosi	Understanding the dynamics of TDP-43 aggregation in FTD using advanced imaging tools	The University of Queensland
Dr Andrew McKinnon	Delineating relationships between sleep-wake disturbances, brain changes, dementia risk factors and the accumulation of dementia pathology	The University of Sydney

* Each Post-doctoral Fellowship is valued at $405,000 over 3 years. Funding commences in 2021.

Project Summaries

Dr Adekunle Bademosi, The University of Queensland

Understanding the dynamics of TDP-43 aggregation in FTD using advanced imaging tools

Frontotemporal dementia (FTD) is associated with progressive damage to the aspects of the human brain involved in the control of movement, problem solving, memory, social behaviour and other vital functions. Post-mortem sampling of the brains of FTD patients revealed the presence of large clumps of proteins, which are toxic and damaging to the brain. The brain is made up of billions of cells called neurons; these protein clumps were shown to build up within some of these neurons. Even though FTD can affect anybody, researchers are yet to identify why these proteins begin to cluster. Further, each neuron has intrinsic protective mechanisms that are normally responsible for clearing up these protein clumps. However, in FTD these protective mechanisms fail. In an attempt to understand how and why FTD begins, this project will use very recently developed advanced imaging tools that have resolutions up to ten million times that of a standard digital camera. This project will utilise these tools to visualise these proteins before, during and after their accumulation within neurons derived from laboratory animals that have been experimentally induced to mimic FTD conditions. The results obtained will help scientists to produce drugs that target FTD.

Dr Andrew McKinnon, The University of Sydney

Delineating relationships between sleep-wake disturbances, brain changes, dementia risk factors and the accumulation of dementia pathology

Dementia is the leading cause of disability in persons over the age of 65 in Australia, with Alzheimer's disease alone accounting for more than 40% of all dementia cases. By addressing risk factors for developing dementia including hypertension, depression, and physical inactivity, one-third of Alzheimer's disease cases and up to 40% of all dementia cases may be preventable. Sleep disturbances including poor sleep quality, and shorter sleep duration, as well as sleep disorders such as sleep apnoea are present in up to 60% of older adults over the age of 60, and in up to 70% of those with dementia. These types of sleep problems are emerging as another significant yet modifiable (for example, through treatment with melatonin or CPAP devices) risk factor for dementia. However, to date, how these sleep problems relate over time to brain and cognition changes, underlying dementia processes, and other risk factors has not been thoroughly investigated. We will address this gap through comprehensively characterising sleep problems in older adults with early dementia or at risk for dementia. Furthermore, we will develop tools that will provide personalised risk profile reports that can be implemented by clinicians to guide strategies for dementia management and prevention for individual patients.